Introduction

The formation of a close positive early relationship between a parent and their baby is widely viewed as important for a range of child outcomes, such as social, emotional and cognitive development. Impaired parent-baby relationships have been estimated to range between three to nine % in the general population (Righetti-Veltema, Conne-Perrard, Bousquet & Manzano, 2002; Skovgaard, Houmann, et al., 2008) and between 10 – 25% in psychiatric samples (Brockington, 2004).

Belsky's model of determinants of parenting (1984) suggests there are three primary determinants of the quality of parent-baby relationship. In order of priority these determinants are the psychological well-being of the parent, the contextual sources of stress and support (e.g., the couple's relationship), and the characteristics of the child (e.g., temperament).

Parental mental health

The transition to parenthood, both in pregnancy and in the early postpartum period, is associated with an increased vulnerability for mental health problems, such as depression (Buist et al., 2008; Paulson & Bazemore, 2010), anxiety (Lee et al., 2007) and PTSD (Ayers & Pickering, 2001) in both parents, with higher prevalence rates amongst women (Ramchandani et al., 2005). Recent studies (Iles, Slade & Spiby, 2011; Wee, Skouteris, Pier, Richardson & Milgrom, 2011) also suggest that psychological symptoms of depression and PTSD could be associated within couples. Findings regarding the course of mental health during the transition to parenthood are inconclusive, with some studies suggesting higher rates of mental health problems in pregnancy both in women and men, especially for anxiety (Figueiredo & Conde, 2011), whilst others show higher rates in the early postpartum, in particular for depression (e.g., Gavin et al., 2005; Paulson & Bazemore, 2010). However, the majority of studies measure mental health only up to one year postpartum (e.g., Lee et al., 2007; White, Matthey, Boyd & Barnett, 2006).

Much literature gives evidence of deficient mother-infant interactive patterns and bonding in mothers with postnatal depression (Edhborg, Matthiesen, Lundh & Widstrom, 2005; Murray, Fiori-Cowley, Hooper & Cooper, 1996). Paternal depression has also been shown to have negative effects on the parenting behaviours of fathers (for a meta-analysis, see Wilson & Durbin, 2010). Some evidence suggests bonding difficulties may also arise in parents suffering from childbirth related PTSD (Muzik et al., 2013; Nicholls & Ayers, 2007; Parfitt & Ayers, 2009). However, longitudinal research of parent-baby bonding that incorporates the father as well as the mother, including a range of mental health variables remains sparse.

The couple's relationship

For fathers as well as mothers the transition from a dyad to a triad, the so called "birth of a family" (Favez, Frascarolo & Fivaz-Depeursinge, 2006), is a time full of psychologically demanding challenges and changes (Goodman, 2005). The capacity to form triadic relationships is crucial for a successful parenthood (Perren et al., 2003).

Family system perspectives have long acknowledged the important role of the inter-parental relationship in influencing the parent-child relationships and vice versa (Erel & Burman, 1995; Florsheim & Smith, 2005), with a contagion of both positive and negative interactive patterns across the family triad (Barnett, Deng, Mills-Koonce, Willougby & Cox, 2008; Ryan, Martin & Brooks-Gunn, 2006). Typical findings are that the more negative the couple's relationship quality, the worse the parent-baby relationship and vice-versa (Carlson, Pilkauskas, McLanahan & Brooks-Gunn, 2011; for a review see Krishnakumar & Buehler, 2000).

Poor relationship quality within the couple may also contribute towards the development of parental mental health problems (Simpson, Rholes, Campbell, Tran &

Wilson, 2003) or alternatively be a consequence of mental health problems (Milgrom & McCloud, 1996). Prospective studies are needed to understand these associations more fully.

Baby characteristics

The temperament of the baby is another potential influence on the parent-baby relationship quality and attachment security (Belsky, 1984; Goldsmith & Alansky, 1987). For example, a difficult temperament in the infant, with expression of negative emotions (Campbell, Cohn & Meyers, 1995) could negatively affect the parent-infant interaction by inducing a vicious circle of mutual rejections between the parent and baby. Similarly, baby characteristics including excessive crying, sleeping difficulties and over sensitivity to stimulation are hypothesised to affect the mother-baby relationship negatively (Hofacker & Papousek, 1998; Zhu et al., 2007).

Rothbart (2007) defines temperament as individual differences in a child's emotional, motor and attentional reactivity and self-regulation. Research suggests that although certain temperamental characteristics are relatively stable across time (e.g., Canals, Hernandez-Martinez & Fernandez-Ballart, 2011), temperament is not just genetically determined, but may change as part of maturation and that it can be affected by and affect the environment (e.g., through parenting).

Difficult infant temperament is commonly reported by parents suffering from depression (Bang, 2011; Hanington, Ramchandani & Stein, 2010). However, some argue that this association may be due to negative parental perceptions rather than a true objective judgement of the child's character (Pauli-Pott, Mertesacker, Bade, Haverkock & Beckmann, 2003). Davies, Slade, Wright and Stewart (2008) similarly found that mothers with PTSD following childbirth perceived their baby's temperament as more difficult accompanied by more negative maternal representations and less optimal mother-infant relationship. Similar

to other areas of research, studies have focused on mothers only, with limited research into the association between father's mental health and perceptions of their infant's temperament, and the parent-baby relationship.

The present study

There are a few gaps in the literature regarding factors associated with the parent-baby bond. Firstly, prospective, longitudinal studies beyond the first postpartum year are sparse. Secondly, research regarding the adverse consequences of parental mental health on the parent-baby bond has mainly been limited to depression and using samples of mothers. This needs to be extended to include other mental health conditions (e.g., PTSD and anxiety), and also include fathers to compare any differential effects from these mental health conditions and any gender differences.

The main aim with this prospective longitudinal study was to explore the associations between and effect of parental mental health (PTSD, depression and anxiety), the couple's relationship quality and infant temperament on the parent-baby bond in both mothers and fathers, concurrently and across time. On the basis of the research reported above, the following hypotheses were made: (1) A low quality of the parent-baby bond will be associated with high levels of mental health symptoms and infant difficulty and low levels of the couple's relationship quality. (2) Mental health symptoms will be associated with each other concurrently and across time, with women experiencing higher levels of mental health symptoms than men (one-tailed prediction).

Method

Participants

Couples (75 women and 66 of their partners) were recruited to the Sussex Journey to Parenthood Study (UK). They were eligible to take part if the women were expecting their

first baby, were cohabiting, fluent in English, over 18 years and gestation was over 30 weeks. At the time of recruitment, women were aged between 22 and 46 years (M = 33.04 SD = 5.19) and men were aged between 26 and 44 years (M = 34.08, SD = 4.59). The average length of the couple's relationship was 73 months for women (SD = 46.49) and 76 months (SD = 56.89) for men. As Table 1 shows, the majority of participants were of white European origin (86%). A high proportion of the sample (86%) had completed a higher education or professional qualification. The sample had relatively high rates of assisted delivery (21%) and planned or emergency caesarean sections (40%).

- Insert Table 1 about here -

Procedure

Recruitment took place through hospital and community antenatal clinics or classes and local advertisements. Eligible, expectant parents received information sheets. Those agreeing to take part were given consent forms and the first set of questionnaires (Time 1). If these documents were not returned within 10 days, the participants were followed up by telephone, mail or email. The second set of questionnaires (Time 2) was posted eight weeks after birth. Fifteen months after the birth the final set of questionnaires (Time 3) was sent out. Participants were contacted within three weeks if questionnaires were not returned at both of these time points. The response rates at different time points were 90%, 77% and 70%. Comparison of participants who completed one or two time points, with participants who completed all three time-points, found no difference on demographic or other study variables, with the exception that participants who did not complete all time-points were more likely to be of a non-white European origin (χ^2 (1) = 5.66, p = .02). The babies were approximately 12 weeks (3 months) old at time 2 (M = 11.70 weeks, SD = 3.04) and 15 months old at time 3 (M = 14.56 months, SD = 2.13).

Measures

Validated measures taken in pregnancy and after birth included affective symptoms (*The Hospital Anxiety and Depression Scale, HADS*, Zigmond & Snaith, 1983) and the couples' relationship *(The Dyadic Adjustment Scale, DAS,* Spanier, 1976). The HADS measures presence or absence of symptoms of anxiety and depression and consist of 14 items rated on a continuous 4- point scale. The total scale ranged from 0 to 42, with high scores indicating more pathological responses. Internal reliability was good at all three time-points (.77, .87, and .84). The DAS was completed at T1 and T3 and measures the quality of the couple's relationship and total scores range from 0 to 151, with higher scores corresponding to a better relationship. The current study's Cronbach Alpha statistics were satisfactory at both time 1 (.89) and time 3 (.94).

Validated postpartum measures included PTSD in relation to childbirth (*The Posttraumatic Stress Diagnostic Scale, PDS*, Foa, Cashman, Jaycox & Perry, 1997), infant characteristics (ICQ) and the parent-baby bond (PBQ). The PDS consists of 17 items that correspond to DSM-IV criteria for a diagnosis of PTSD (5 intrusion, 7 avoidance and 5 arousal items). Total scores range from 0 to 51, with higher scores indicating a greater symptom severity. Internal consistency was good at both time points ($\alpha = .87$).

The Infant Characteristic Questionnaire, ICQ, (Rothbart, 1981) measures parents' perception of their baby's temperament. Total scores ranging from 24 to 168 and higher scores indicate a more difficult temperament. Internal consistency was good at both time points ($\alpha = .84$ at T2 and .86 at T3).

The Postpartum Bonding Questionnaire, PBQ, (Brockington, Fraser & Wilson, 2006) measures the quality of the parent-baby bond. It consists of 25 items, rated on a 6-point Likert scale, with total scores ranging from 0 to 125, where high scores indicate a poorer parent-baby bond. The internal reliability for the total scale at T2 was .85 and for T3, .84.

- Insert Table 2 about here -

Statistical analysis

Data screening revealed that some variables were significantly skewed. Therefore, nonparametric tests were used where possible. Where parametric tests were necessary analyses were performed on the raw and transformed data (log transformation). However, the pattern of results did not differ so analyses on the raw data are presented, as they are conceptually more meaningful (Tabachnick & Fidell, 2007).

The associations between the continuous main variables were examined using statistical Spearman's (*rho*) rank order correlation test. Mean differences between gender and time-points were compared using repeated ANOVAs. The relationships between psychological, social and infant temperament variables on the quality of parent-baby bond at both postpartum time points were examined in hierarchical multiple regression analyses separately for men and women. Examination of residuals showed that the assumptions of multiple regressions regarding multicollinearity, homoscedasticity, independence and normally distributed errors were met. It should be noted that the small sample size, with a low ratio of participant to predictor variables limited the multiple regression analyses to the main scales only, rather than examining subscales.

Results

Comparisons of symptoms across time and gender

Repeated ANOVA's (Table 3) show that there was a significant change over time for anxiety symptoms and total symptoms of anxiety and depression, which were higher in pregnancy and 15 months postpartum, compared to after birth, indicating greater levels of psychological distress in pregnancy and later postpartum. Additionally, post-hoc tests revealed that both the combined measure of anxiety and depression symptoms as well as anxiety symptoms alone

were significantly higher in pregnancy compared to three months postpartum. In addition, significant changes could be seen over time in the couple's relationship, with the couple's relationship being significantly worse 15 months postpartum compared to in pregnancy, both for men and women. Table 3 also shows that parents perceived their baby's temperament as significantly more difficult in early postpartum compared to later postpartum. The decrease in means for the total postpartum bonding scale further suggested that the parents' bonding to their baby generally improved over time.

Gender differences were mainly found with regards to mental health variables, with women reporting significantly more overall symptoms of PTSD. The means of women's depression symptoms and for the total hospital depression and anxiety scale were also significantly higher than for the men. No significant gender differences were found for the other variables. Within couple concordance patterns, revealed that mental health symptoms within the couples were not significantly associated at any time point. However, the couple's relationship and parental reports of their baby's temperament were significantly associated within couples at all time-points (r_s range = .33 to .66). The couple concordance of parent-baby bonding was also significant at three months postpartum (r_s = .51).

- Insert Table 3 about here -

Associations between variables

Anxiety, depression and PTSD symptoms were mostly significantly associated with each other at all time-points, for both men and women. Table 4 shows that the majority of parental mental health variables were significantly associated with the parent-baby bond at both three months and 15 months postpartum. Additionally, medium sized bivariate correlations with the parent-baby bond were found for the majority of other main study variables at both postpartum time-points, especially for men. These associations were all in the predicted direction, with higher levels of mental health symptoms, lower quality of the couple's

relationship and more difficult infant temperament being associated with poorer quality of parent-baby bonding.

- Insert Table 4 about here -

Multivariate predictors of the parent-baby bond

Four hierarchical multiple regression analyses were conducted to address the main aim of the study which was to prospectively examine the impact of parental mental health, the couple's relationship and infant temperament variables on the parent-baby bond at three months and 15 months postpartum, separately for women and men. Variables which had medium sized bivariate relationships ≥.2 (Cohen, 1992) with these outcome measures were entered into the models.

Results of the first analyses predicting the parent-baby bond at three months postpartum are shown in Table 5. It shows that each step of predictors significantly increased the proportion of variance for the parent-baby bond, both for men and women, with the exception of step 1 for men (couple's relationship in pregnancy). For women, 53 % of the variance for the mother-baby bond three months postpartum was explained by the predictors, F (5, 43) = 9.72, $p < .001$. Significant individual predictors were the couple's dyadic relationship in pregnancy and concurrent measures of the infant's temperament. For men, 39% of the variance was accounted for by the predictors, F (4, 34) =5.33, $p < .002$, with significant predictors being the same as for women.

- Insert Table 5 about here –

Results of the analyses predicting the parent-baby bond 15 months postpartum are presented in Table 6. These analyses showed that for women, the predictors explained 55% of the variance (F (7, 36) = 13.70, $p < .001$) and for men 86% of the variance of the final model (F (9, 17) = 11.57, $p < .001$). For women, the mother-baby bond at three months and the infant's temperament at 15 months postpartum added a unique significant contribution to the

mother-baby bond at 15 months postpartum. For men, affective symptoms at three months and also at 15 months postpartum were significant predictors for the father-baby bond at 15 months postpartum. Additionally, men's pregnancy and concurrent relationship with their partner added a unique significant contribution to the father-baby bond at 15 months, even after accounting for the early father-baby bond. However, net suppressor effects (Howell, 2009) were observed for affective symptoms at three months and the couple's concurrent relationship. A suppressor variable can be defined as a variable which increases the predictive validity of another variable (or set of variables) by its inclusion into a regression equation. Therefore, overall, these results suggest that apart from the early father-baby bond, the most important predictors for the father-baby bond at 15 months were concurrent affective symptoms and the relationship men had with their partner during pregnancy. However, caution should be taken as the suppressor variables may enhance the importance of other variables.

- Insert Table 6 about here -

Discussion

The results of this prospective study support Belsky's model of parenting and the hypotheses made, in that a poor parent-baby bond was associated with a less optimal couple's relationship, higher levels of mental health symptoms and more difficult infant temperament. Regression analyses suggested that the couple's pregnancy relationship, the infant's temperament, and for men their mental health, were the most important predictors for the parent-baby bond.

Comparisons of symptoms across time and gender

The finding that symptoms of anxiety were significantly higher in pregnancy compared to postpartum highlights the need to help parents cope with anxiety already in pregnancy. It is broadly consistent with previous research regarding higher prevalence of anxiety in

pregnancy, both in women (Andersson, Sundstrom-Poromaa, Wulff, Astrom & Bixo , 2006; Rubertsson, Hellstrom, Cross & Sydsjo, 2014) and men (Condon, Boyce, Corkindale , 2004; Figueiredo & Conde, 2011). Furthermore, as predicted, the majority of mental health variables were significantly correlated with each other at all time-points, indicating a high co-morbidity of depression, anxiety and PTSD, an already well-established finding with regards to childbirth related psychological symptoms (Parfitt & Ayers, 2009; White et al., 2006;).

The finding of the significant decline in the couple's relationship is consistent with other transition to parenthood literature (for a review see Bateman & Bharj, 2009). Also, similarly to the current study, Muzik et al. (2013) found a general increase in the mother-infant bonding quality over the first six months postpartum irrespective of risk status (e.g., mental health problem), but longitudinal research of the trajectory of both parents' bonding with their baby past this early period remains sparse. Gender comparisons revealed that as predicted and in line with previous studies (Goodman, 2004; Ramchandani et al., 2005), on average, women suffered from worse mental health than men, with significantly higher levels of PTSD and depressive symptoms. In contrast to Iles et al.'s study (2011), none of the psychological symptoms in the present study were significantly related within couples, which may be explained by differences in type and timing of measures between these two studies. However, the finding that the couple's relationship and reports of the infant characteristics and the parent-baby bond were significantly associated within couples, is supported by literature regarding family interactions (Fivaz-Depeursinge, Favez, Lavanchy, De Noni & Frascarolo, 2005) and co-parenting (Barnett et al., 2008; Ryan et al., 2006; Davis, Schoppe-Sullivan, Mangelsdorf & Brown, 2009).

Factors associated with the parent-baby bond

As predicted, many medium sized or large bivariate associations were found between parental mental health and the parent-baby bond. Multivariate analyses also suggested that

men's affective symptoms predicted the father-baby bond at 15 months. This supports current research of the associations between father's mental health and the father-infant relationship (e.g., for a review see Wilson & Durbin, 2010). It also emphasises the importance of attending to men's psychological well-being in the transition to parenthood period.

The lack of a significant contribution of individual mental health symptoms on the parent-baby bond at three months postpartum may be explained by the symptom overlap between anxiety, depression and PTSD, as their combined but not their individual contribution significantly predicted the parent-baby bond at three months, both for women and men.

The most important determinants of both the mother-baby and father-baby bond at three months postpartum were the couples' relationship during pregnancy and concurrent infant temperament. The finding that a difficult infant temperament is associated with a less optimal parent-baby relationship has been acknowledged in previous research (Mantymaa, Puura, Luoma, Salmelin & Tamminen, 2006; Murray, FioriCowley et al., 1996). The greater contribution of the baby's concurrent temperament on the mother-baby bond compared to the father-baby bond at 15 months postpartum may tentatively be explained by the fact that usually mothers spend more time with the baby during the first year. This may therefore suggest that they evaluate their bonding with their baby and general motherhood ability in terms of their baby's temperament, i.e., feeling good about their relationship if their baby is 'easy' and vice versa. Clinically, targeting mothers' early negative perceptions of their baby may be of special importance as this has been linked to later child behavioural problems (Forman et al., 2007).

The importance of the couple's relationship in pregnancy as a predictor of the parent-baby bond was also emphasised by the results of this study, and supports research which

suggests that the parent- baby relationship can be predicted already in pregnancy, by the interactions of the couple (Favez et al., 2006; Florsheim & Smith, 2005). This also suggests a causal direction with the couple's relationship influencing the parent-baby relationship, rather than the other way around. An explanation of the crucial importance of the pregnancy relationship may be that this measure is representative of the parents fundamental underlying internal mental representations of attachment relationships in general (e.g., Isles et al., 2011; Mantymaa et al., 2006), and as such may have a greater influence on the parent's ability to bond with their baby both short-term and long-term, compared to later measures.

Methodological issues and future directions

Strengths of the current study include the prospective longitudinal design which enabled comparisons across time between the mental health and relationship measures and also allowed for measurements of baseline symptoms in pregnancy. Secondly, the inclusion of men permitted some gender comparisons. Additionally, the effects of PTSD on the parent-baby relationship have not been widely studied.

However, a few limitations need to be taken into account when interpreting the results, namely that the sample is relatively small and consists of predominantly white European and highly educated parents. The sample size meant the study was only powered to identify medium or large effects and analyses had to be restricted to the main variables only, rather than examining subscales. Attrition rates between the time points additionally reduced the sample size, especially when comparing across time-points. Future research should therefore be carried out with larger, more representative samples to enable the application of more complex analyses (e.g., structural equation modelling, SEM) of variables.

Conclusions and implications

The findings from this study of mothers' and fathers' transition to parenthood indicate that parents' perceptions of their infant's temperament and their relationship with their partner during pregnancy are important predictors of the parent-baby bond three months and 15 months postpartum. This highlights the importance of interventions targeting the couple's relationship and helping parents to perceive their baby's temperament positively as early as possible, to prevent negative long-term interactive patterns from forming. The significant impact of men's concurrent affective symptoms on their bond with their baby at 15 months postpartum further emphasises the importance of enhancing fathers' mental well-being in their transition to parenthood. Future studies would benefit from exploring the parent-baby bonding process and interactions between parental, baby and contextual factors further, prospectively across time, in larger samples of mothers and fathers.

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Table 1. Sample characteristics for demographic variables.

	Total Sample No. (%)	Women No. (%)	Men No. (%)
Ethnicity			
White European	111 (86.0)	61 (85.9)	50 (86.2)
African	1 (0.8)	0 (0.0)	1 (1.7)
Indian	2 (1.6)	1 (1.4)	1 (1.7)
Mixed race	6 (4.7)	4 (5.6)	2 (3.4)
Other	9 (7.0)	5 (7.0)	4 (6.9)
Education			
None	2 (1.6)	1 (1.4)	1 (1.7)
GCSE	3 (2.3)	1 (1.4)	2 (3.4)
A-levels	13 (10.2)	7 (10.0)	6 (10.3)
Diploma	13 (10.2)	7 (10.0)	6 (11.9)
Undergraduate	36 (28.1)	19 (27.1)	17 (29.3)
Postgraduate	24 (18.8)	13 (18.6)	11 (19.0)
Professional qualification	37 (28.9)	22 (31.4)	15 (25.9)
Delivery type			
Normal delivery	41 (39.0)	23 (40.4)	18 (37.5)
Assisted delivery	22 (21.0)	12 (21.1)	10 (20.8)
Emergency caesarean	34 (32.4)	19 (33.3)	15 (31.3)
Elective caesarean	8 (7.6)	3 (5.3)	5 (10.4)

Note: GCSE = General Certificate of Secondary Education (age 16); A'Level = Advanced Level Examinations (age 18). Number of women ranged from 57 to 71 and men from 48 to 58**.**

Table 2. Questionnaire Measures used at the different Time Points.

Pregnancy (T1) 30+ weeks gestation	After birth (T2) 3 months postpartum	After birth (T3) 15 months postpartum
Demographic characteristics	Delivery details	-
Parental mental health: Depression & Anxiety (HADS)	Parental mental health: Depression, Anxiety & PTSD (HADS & PDS)	Parental mental health: Depression, Anxiety & PTSD (HADS & PDS)
Couple's relationship (DAS)	-	Couple's relationship (DAS)
-	Parent-baby bond (PBQ)	Parent-baby bond (PBQ)
-	Infant temperament (ICQ)	Infant temperament (ICQ)

Table 3. Repeated ANOVA of main study variables.

	Pregnancy (T1) Mean (*SD*)		3 months postpartum (T2) Mean (*SD*)		15 months postpartum (T3) Mean (*SD*)		Time	Gender
	Women	Men	Women	Men	Women	Men	*F* (*df*)	*F* (*df*)
PTSD symptoms	-	-	5.41 (6.55)	2.72 (2.55)	5.18 (5.72)	3.75 (6.02)	0.41 (1, 83)	3.87^{+} (1, 83)
Affective symptoms	11.84 (5.15)	9.50 (5.45)	10.00 (6.48)	7.68 (5.81)	10.46 (5.82)	9.10 (6.02)	4.17* (2,148)[a]	3.12^{+} (2, 148)
Anxiety	6. 70 (2.56)	6.28 (3.50)	5.77 (4.24)	4.44 (3.35)	6.09 (3.24)	4.95 (3.42)	6.16**(2,148)[b]	2.26 (2, 148)
Depression	5.14 (3.30)	3.22 (2.65)	4.23 (2.80)	3.24 (2.99)	4.36 (3.31)	4.15 (3.52)	1.15 (2, 148)	3.19^{+} (2, 148)
Couples relationship	117.93 (15.38)	119.23 (11.39)	-	-	111.68(18.45)	113.34 (18.23)	18.98***(1,85)	0.20(1, 85)
Infant temperament	-	-	69.22 (13.37)	70.82 (13.68)	64.19 (12.71)	64.99 (13.59)	14.30*** (1,80)	0.21 (1, 80)
Parent-baby bond	-	-	11.49 (7.88)	13.08 (10.93)	11.18 (7.05)	13.00 (8.83)	0.07(1, 81)	0.94 (1, 81)
Impaired bonding	-	-	6.11 (4.11)	6.66 (5.55)	5.97 (3.87)	6.40 (4.39)	0.24 (1, 81)	0.30(1, 81)
Rejection & Anger	-	-	2.46 (2.94)	3.12 (3.34)	2.81 (2.65)	3.26 (2.92)	0.79 (1, 81)	0.89 (1, 81)
Anxiety	-	-	2.90 (1.86)	2.88 (1.73)	2.30 (1.61)	2.89 (2.25)	1.59(1, 80)	0.67(1, 80)
Incipient Abuse	-	-	0.08 (.28)	0.44 (1.76)	0.06 (.32)	0.47 (1.19)	0.01 (1, 79)	3.28 (1, 79)

Note: $*p < .05$. $**p<.01$. $***p<.001$. For one tailed: $^{+}p<.05$. $^{++}p<.01$. $^{+++}p<.001$. Number of women ranged from 44 to 52 and men from 32 to 37**.** Post-hoc tests revealed significant differences time differences between pregnancy and 3 months postpartum, [a] t (90) = 3.91, $p<.001$, [b] t (90) = 4.25, $p<.001$.

Table 4. Correlations between main study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.Parent baby bonding (T2)	1	.76**	.05	.55**	.27	.48**	.30	-.21	-.28	.59**	.47**
2. Parent baby bonding (T3)	.61**	1	-.02	.37*	.61**	.39*	.49**	-.46*	-.57**	.46**	.58**
3. Anxiety & Depression (T1)	.49**	-.01	1	.49**	.33*	.46**	.23	-.22	-.16	.01	-.03
4. Anxiety & Depression (T2)	.37**	.11	.57**	1	.46**	.64**	.49**	.03	-.09	.43**	.34*
5. Anxiety & Depression (T3)	.21	.32*	.41**	.65**	1	.44**	.65**	-.32	-.57**	.16	.34*
6. PTSD (T2)	.20	.27	.47**	.63**	.42**	1	.33*	.04	-.11	.37*	.39*
7. PTSD (T3)	.23	.28*	.28*	.53**	.64**	.51**	1	-.14	-.50**	.21	.25
8. Couple's relationship (T1)	-.41**	-.25	-.28*	-.12	-.23	-.06	-.10	1	.77**	.05	-.13
9. Couple's relationship (T3)	-.32*	-.34**	-.31*	-.17	-.45**	-.17	-.48**	.66**	1	-.14	-.41**
10. Infant temperament (T2)	.26	.17	.03	.21	-.09	.18	.15	-.02	-.18	1	.65**
11. Infant temperament (T3)	.15	.59**	.01	.04	.24	.18	.30*	-.04	-.34**	.39**	1

Note: *p < .05. **p<.01. ***p<.001. T1 = time 1, late pregnancy; T2= time 2, 3 months postpartum; T3 = time 3, 15 months postpartum. The number of participants in the total sample varied from 82 to 125. Men (upper triangle), n = 34 – 57 and women (lower triangle), n = 48 - 68.

Table 5. Hierarchical regression analyses predicting parent-baby bond quality 3 months after birth.

		Women (n = 49)		
Predictor	*B*	*SE B*	B	$R^2\Delta$
Step 1				.30***
Affective symptoms in pregnancy	0.07	0.26	.04	
Couples relationship in pregnancy	-0.21	0.06	-.38**	
Step 2				.09*
PTSD symptoms (3 months)	0.22	0.18	.19	
Affective symptoms (3 months)	0.32	0.21	.26	
Step 3				.14***
Infant temperament (3 months)	0.23	0.06	.38***	
Total R^2				.53***
F				9.72
		Men (n = 39)		
Step 1				.07
Couples relationship in pregnancy	-0.36	0.14	-.35*	
Step 2				. 21**
PTSD symptoms (3 months)	-0.14	0.81	-.03	
Affective symptoms(3 months)	0.60	0.36	.33	
Step 3				.11*
Infant temperament (3 months)	0.27	0.11	.37*	
Total R^2				.39**
F				5.33

Note: *p < .05. **p < .01. ***p < .001.

Table 6. Hierarchical regression analyses predicting parent-baby bond quality 15 months after birth.

			Women (n = 44)	
Predictor	*B*	*SE B*	β	$R^2\Delta$
Step 1				.07
Couples relationship in pregnancy	-0.07	0.07	-.15	
Step 2				.50***
Parent-baby bond (3 months)	0.52	0.11	.57***	
Step 3				.00
PTSD symptoms (3 months)	-0.10	0.13	-.09	
Step 4				.02
PTSD symptoms (15 months)	0.13	0.20	.10	
Affective symptoms(15 months)	0.17	0.17	.14	
Step 5				.00
Couples relationship (15 months)	0.10	0.06	.25	
Step 6				.14***
Infant temperament (15 months)	0.24	0.06	.43***	
Total R^2				.73***
F				13.70***
			Men (n = 27)	
Predictor	*B*	*SE B*	β	$R^2\Delta$
Step 1				.13
Couples relationship in pregnancy	-0.25	0.11	-.36*	
Step 2				.51***
Parent-baby bond (3 months)	0.57	0.10	.82***	
Step 3				.06
PTSD symptoms (3 months)	0.59	0.48	.20	
Affective symptoms (3 months)	-0.49	0.20	-.39*	
Infant temperament (3 months)	0.07	0.09	.14	
Step 4				.11**
PTSD symptoms (15 months)	0.17	0.20	.13	

Affective symptoms (15 months)	0.67	0.20	.50*	
Step 5				.04*
Couples relationship (15 months)	0.22	0.10	.50*	
Step 6				.01
Infant temperament (15 months)	0.07	0.09	.12	
Total R^2				.86***
F				11.57***

Note: *$p < .05$. **$p < .01$. ***$p < .001$. Caution should be taken as the ratio of participants to predictor variables is low.